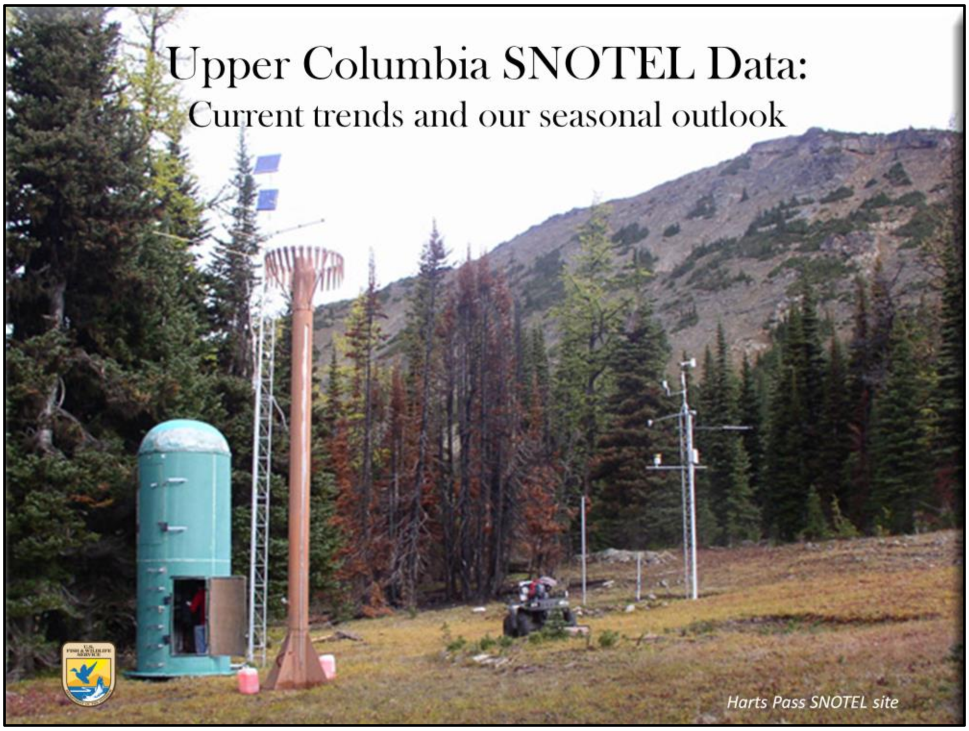
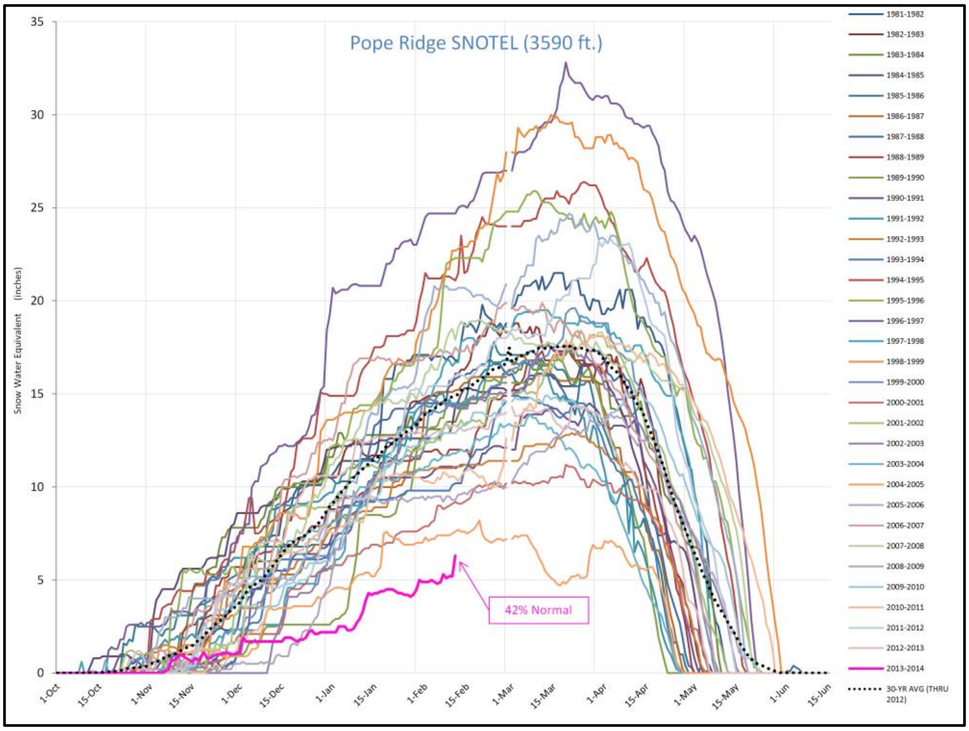
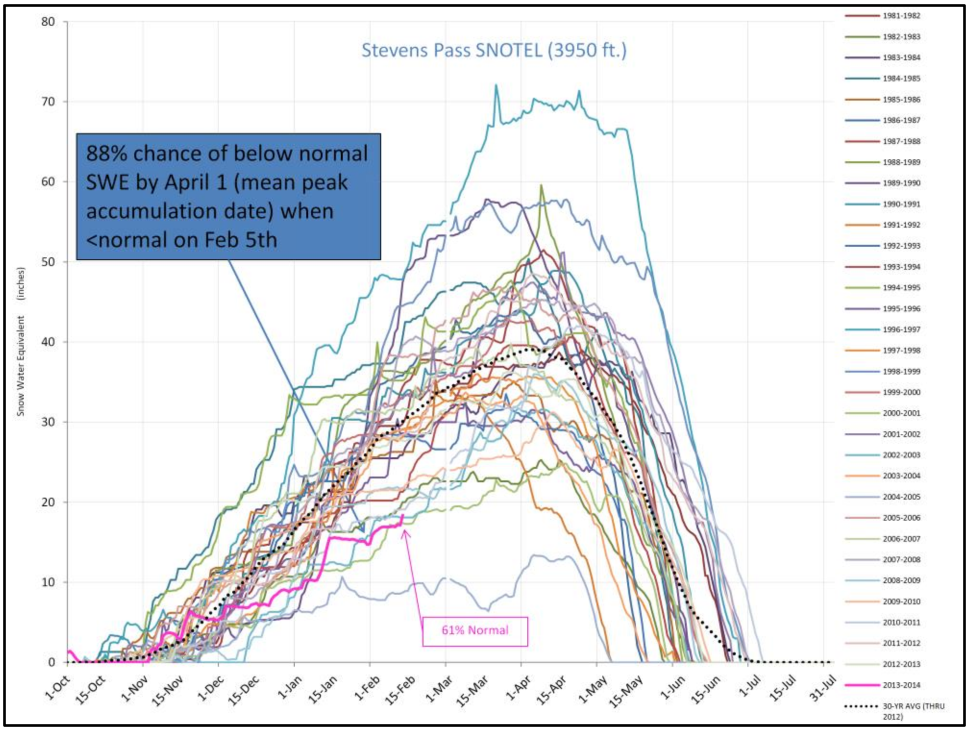
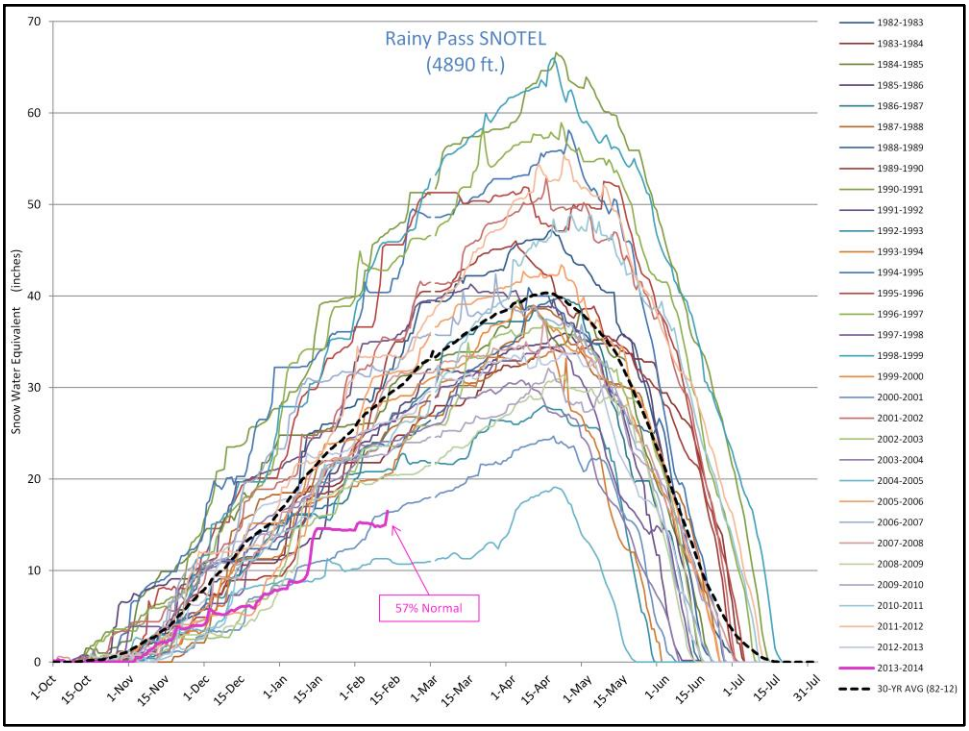

Upper Columbia SNOTEL Data:
Current trends and our seasonal outlook
Harts Pass SNOTEL site

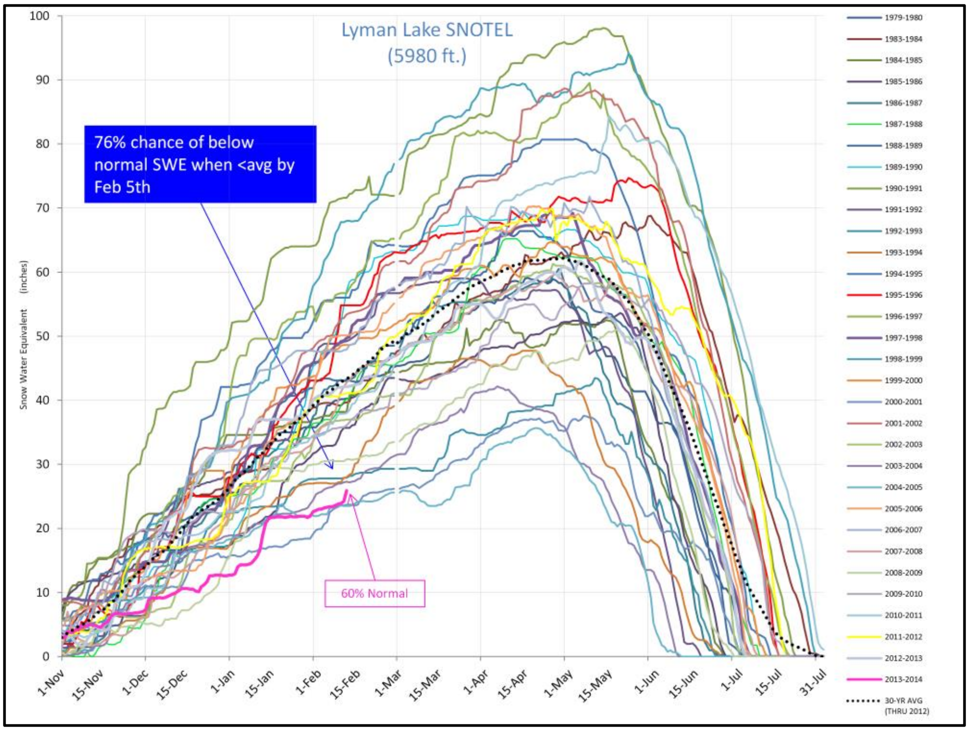


Pope Ridge SNOTEL (3590 ft.)
Snow Water Equivalent (inches)
42% Normal
1981-1982
1982-1983
1983-1984
1984-1985
1985-1986
1986-1987
1987-1988
1988-1989
1989-1990
1990-1991
1991-1992
1992-1993
1993-1994
1994-1995
1995-1996
1996-1997
1997-1998
1998-1999
1999-2000
2000-2001
2001-2002
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
30-YR AVG (THRU 2012)


Stevens Pass SNOTEL (3950 ft.)
88% chance of below normal SWE by April 1 (mean peak accumulation date) when <normal on Feb 5th
61% Normal
Snow Water Equivalent (inches)
0
10
20
30
40
50
60
70
80
1-Oct
15-Oct
1-Nov
15-Nov
1-Dec
15-Dec
1-Jan
15-Jan
1-Feb
15-Feb
1-Mar
15-Mar
1-Apr
15-Apr
1-May
15-May
1-Jun
15-Jun
1-Jul
15-Jul
31-Jul
1981-1982
1982-1983
1983-1984
1984-1985
1985-1986
1986-1987
1987-1988
1988-1989
1989-1990
1990-1991
1991-1992
1992-1993
1993-1994
1994-1995
1995-1996
1996-1997
1997-1998
1998-1999
1999-2000
2000-2001
2001-2002
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
30-YR AVG (THRU 2012)



Rainy Pass SNOTEL
(4890 ft.)
Snow Water Equivalent (inches)
57% Normal
1-Oct
15-Oct
1-Nov
15-Nov
1-Dec
15-Dec
1-Jan
15-Jan
1-Feb
15-Feb
1-Mar
15-Mar
1-Apr
15-Apr
1-May
15-May
1-Jun
15-Jun
1-Jul
15-Jul
31-Jul
1982-1983
1983-1984
1984-1985
1985-1986
1986-1987
1987-1988
1988-1989
1989-1990
1990-1991
1991-1992
1992-1993
1993-1994
1994-1995
1995-1996
1996-1997
1997-1998
1998-1999
1999-2000
2000-2001
2001-2002
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
30-YR AVG (82-12)



Lyman Lake SNOTEL
(5980 ft.)
76% chance of below normal SWE when <avg by Feb 5th
60% Normal
Snow Water Equivalent (inches)
100
90
80
70
60
50
40
30
20
10
0
1-Nov
15-Nov
1-Dec
15-Dec
1-Jan
15-Jan
1-Feb
15-Feb
1-Mar
15-Mar
1-Apr
15-Apr
1-May
15-May
1-Jun
15-Jun
1-Jul
15-Jul
31-Jul
1979-1980
1983-1984
1984-1985
1985-1986
1986-1987
1987-1988
1988-1989
1989-1990
1990-1991
1991-1992
1992-1993
1993-1994
1994-1995
1995-1996
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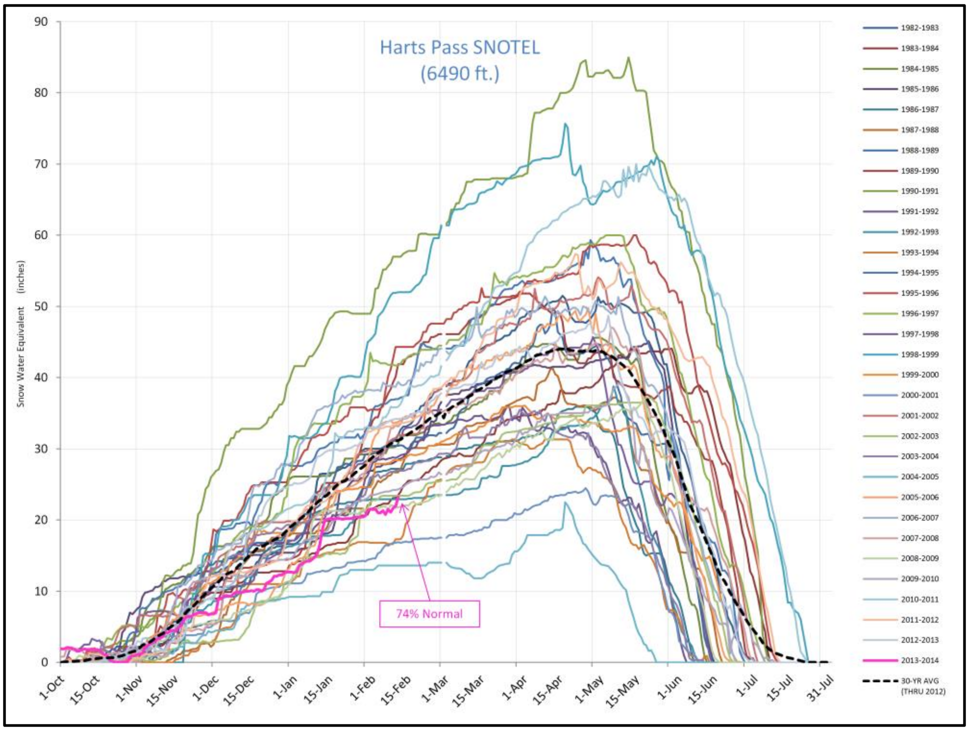
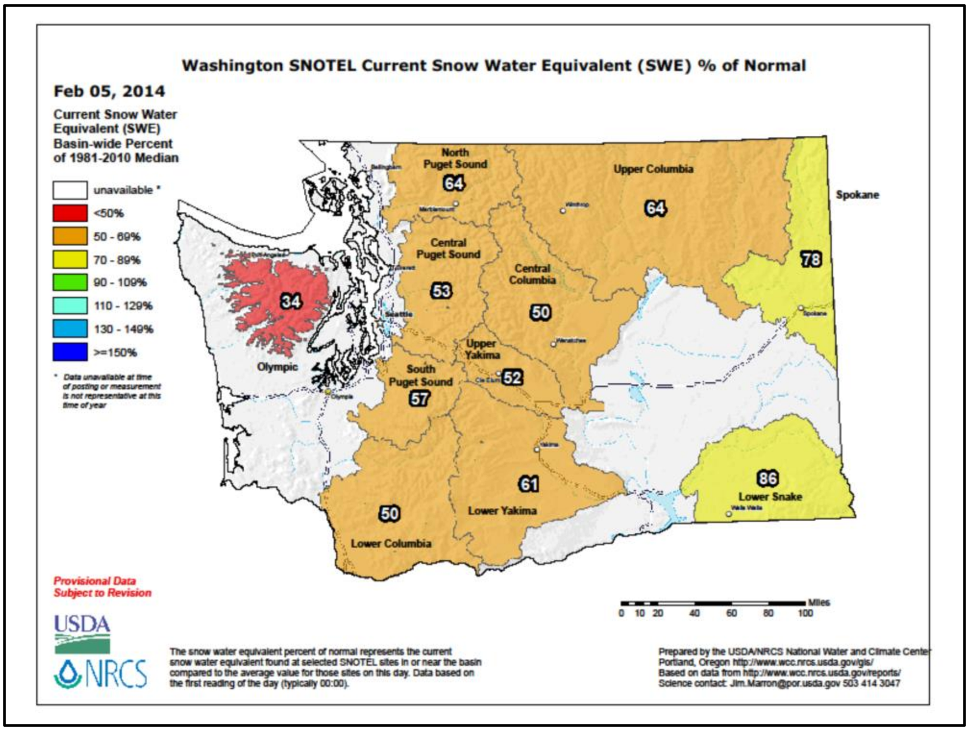
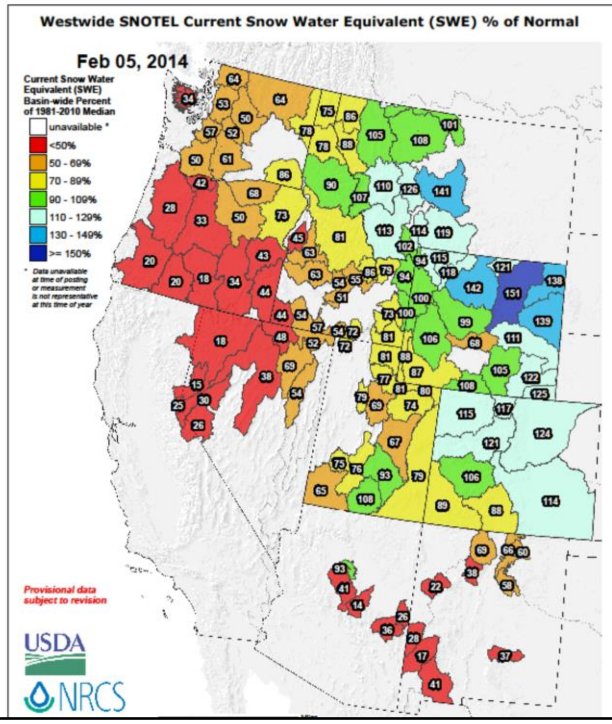
2001-2002
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
30-YR AVG (THRU 2012)



Harts Pass SNOTEL
(6490 ft.)
Snow Water Equivalent (inches)
90
80
70
60
50
40
30
20
10
0
1-Oct
15-Oct
1-Nov
15-Nov
1-Dec
15-Dec
1-Jan
15-Jan
1-Feb
15-Feb
1-Mar
15-Mar
1-Apr
15-Apr
1-May
15-May
1-Jun
15-Jun
1-Jul
15-Jul
31-Jul
74% Normal
1982-1983
1983-1984
1984-1985
1985-1986
1986-1987
1987-1988
1988-1989
1989-1990
1990-1991
1991-1992
1992-1993
1993-1994
1994-1995
1995-1996
1996-1997
1997-1998
1998-1999
1999-2000
2000-2001
2001-2002
2002-2003
2003-2004
2004-2005
2005-2006
2006-2007
2007-2008
2008-2009
2009-2010
2010-2011
2011-2012
2012-2013
2013-2014
30-YR AVG
(THRU 2012)



Washington SNOTEL Current Snow Water Equivalent (SWE) % of Normal
Feb 05, 2014
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median
unavailable *
<50%
50 - 69%
70 - 89%
90 - 109%
110 - 129%
130 - 149%
>=150%
* Data unavailable at time of posting or measurement is not representative at this time of year
North Puget Sound
64
Upper Columbia
64
Spokane
78
Central Puget Sound
53
Central Columbia
50
34
Olympic
Upper Yakima
52
South Puget Sound
57
61
86
Lower Snake
50
Lower Yakima
Lower Columbia
Provisional Data Subject to Revision
Miles
0 10 20 40 60 80 100
USDA
NRCS
The snow water equivalent percent of normal represents the current snow water equivalent found at selected SNOTEL sites in or near the basin compared to the average value for those sites on this day. Data based on the first reading of the day (typically 00:00).
Prepared by the USDA/NRCS National Water and Climate Center Portland, Oregon http://www.wcc.nrcs.usda.gov/gis/
Based on data from http://www.wcc.nrcs.usda.gov/reports/
Science contact: Jim.Marron@por.usda.gov 503 414 3047


Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal
Feb 05, 2014
Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median
unavailable *
<50%
50 - 69%
70 - 89%
90 - 109%
110 - 129%
130 - 149%
>= 150%
* Data unavailable at time of posting or measurement is not representative at this time of year
Provisional data subject to revision

Snow Water Equivalents (inches)

Provided by the California Cooperative Snow Surveys

Data For: **11-Feb-2014**

% Apr 1 Avg. / % Normal for this Date

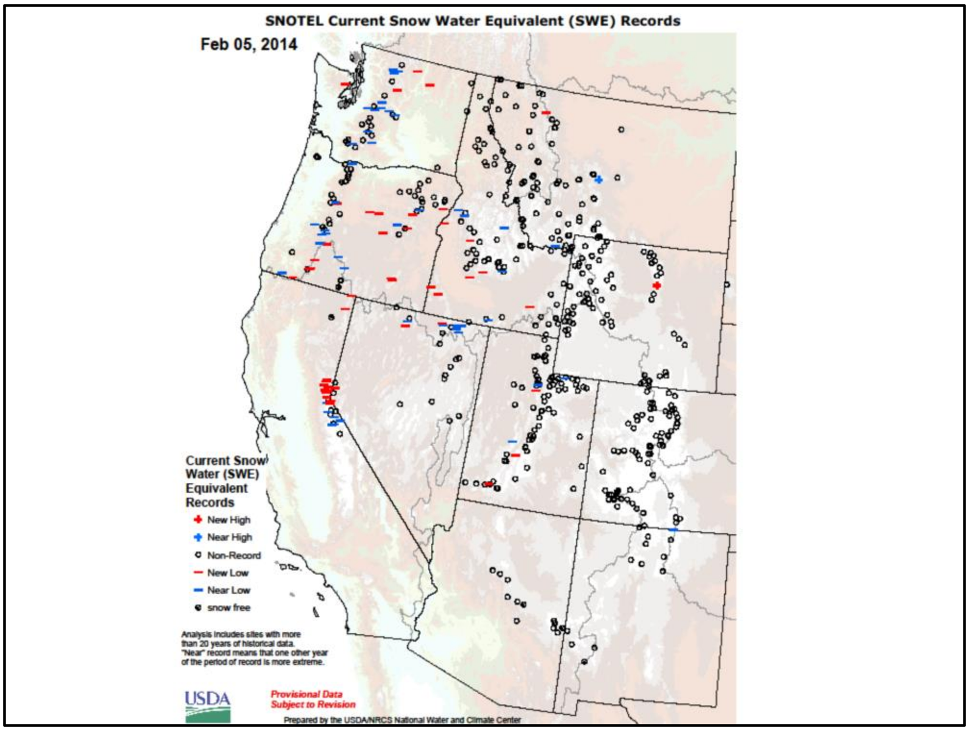
Change Date : 11-Feb-2014 Refresh Data

NORTH	
Data For: 11-Feb-2014	
Number of Stations Reporting	28
Average snow water equivalent	3.9"
Percent of April 1 Average	14%
Percent of normal for this date	19%

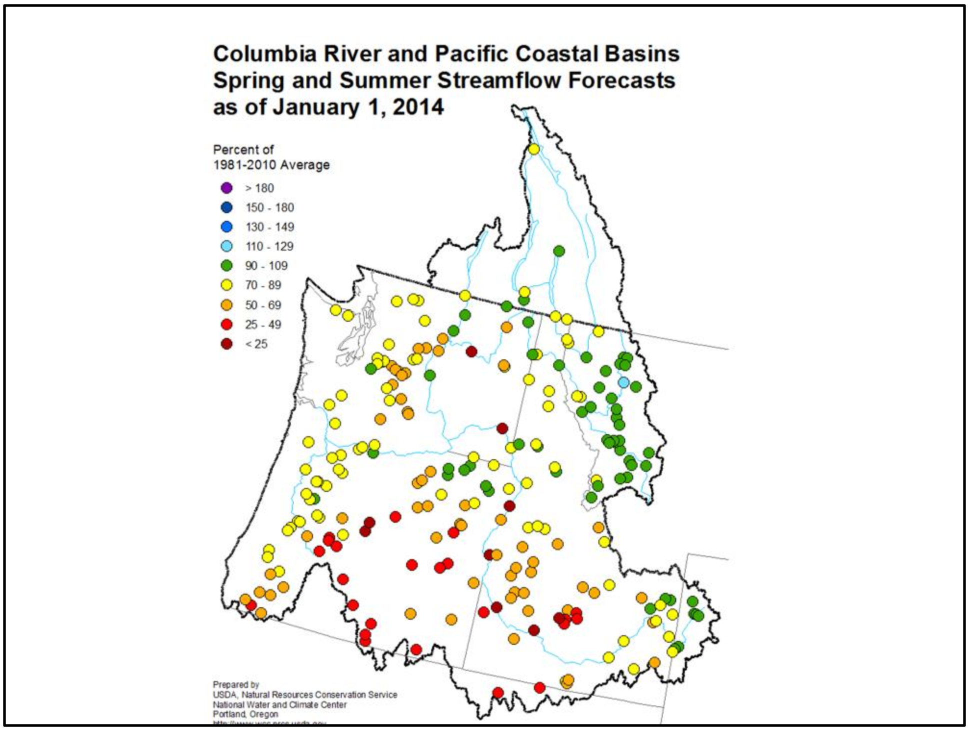
CENTRAL	
Data For: 11-Feb-2014	
Number of Stations Reporting	44
Average snow water equivalent	7.9"
Percent of April 1 Average	26%
Percent of normal for this date	36%

SOUTH	
Data For: 11-Feb-2014	
Number of Stations Reporting	33
Average snow water equivalent	4.7"
Percent of April 1 Average	18%
Percent of normal for this date	26%

STATEWIDE SUMMARY	
Data For: 11-Feb-2014	
Number of Stations Reporting	105
Average snow water equivalent	5.8"
Percent of April 1 Average	20%
Percent of normal for this date	28%

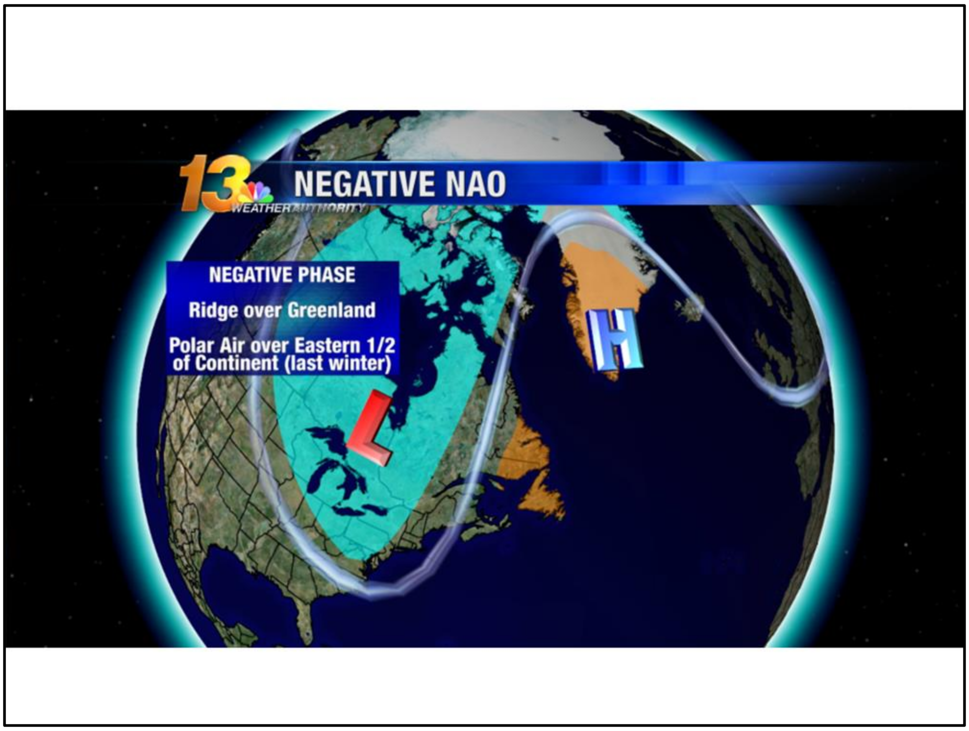


SNOTEL Current Snow Water Equivalent (SWE) Records
Feb 05, 2014
Current Snow Water (SWE) Equivalent Records
New High
Near High
Non-Record
New Low
Near Low
snow free
Analysis includes sites with more than 20 years of historical data.
"Near" record means that one other year of the period of record is more extreme.
USDA
Provisional Data Subject to Revision
Prepared by the USDA/NRCS National Water and Climate Center

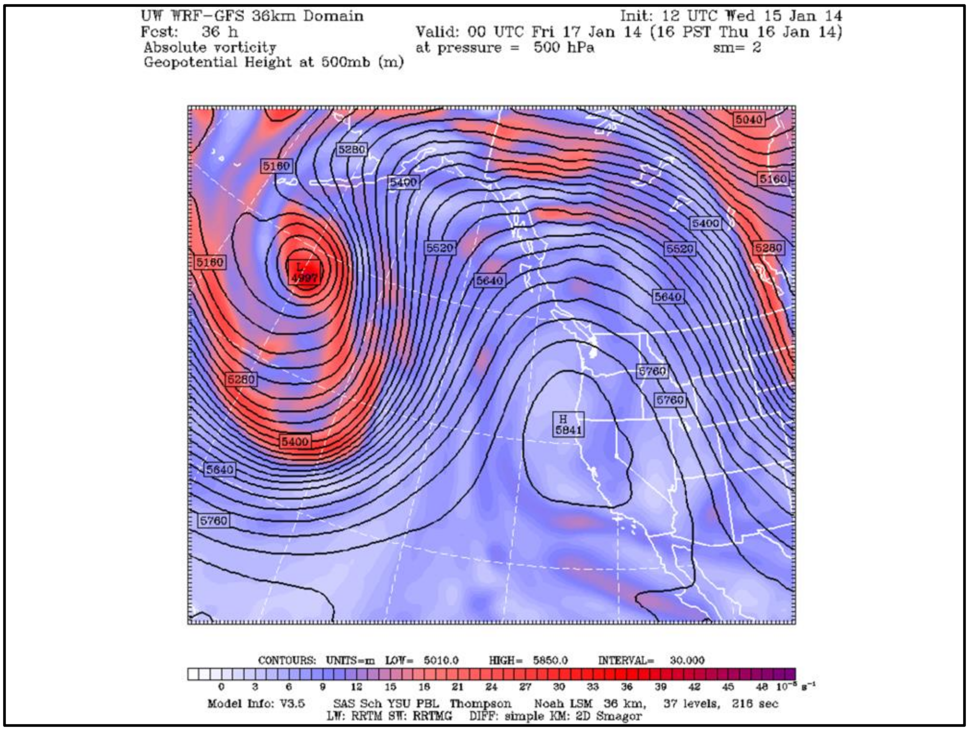


Plot showing the 50 Percent Chance of Exceedance Forecast. There is a 50 percent chance that the actual streamflow volume will exceed this forecast value, and there is a 50 percent chance that the actual streamflow volume will be less than this forecast value. Generally, this forecast is the middle of the range of possible streamflow volumes that can be produced given current conditions.

This shows the persistent pattern we have observed for most of this winter so far.



The ridge in the western US has led to strongly elongated low pressure in the eastern US with another downstream blocking high pressure over Greenland.



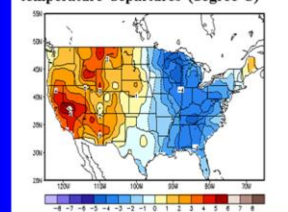
Typical eastern Pacific surface plot for an Omega Block pattern.

U.S. Temperature and Precipitation Departures During the Last 30 and 90 Days

Last 30 Days

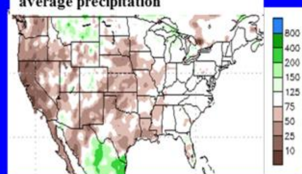
30-day (ending 1 Feb 2014) % of average precipitation

30-day (ending 1 Feb 2014) temperature departures (degree C)

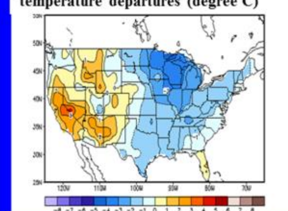


Last 90 Days

90-day (ending 1 Feb 2014) % of average precipitation

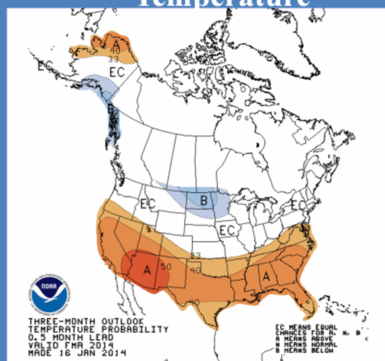


90-day (ending 1 Feb 2014) temperature departures (degree C)

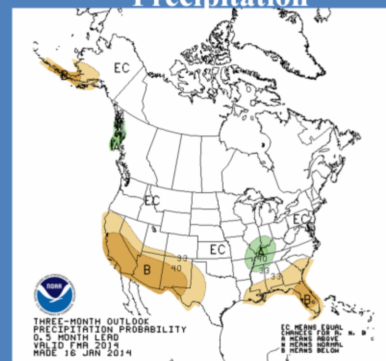


U. S. Seasonal Outlooks
February – April 2014

Temperature



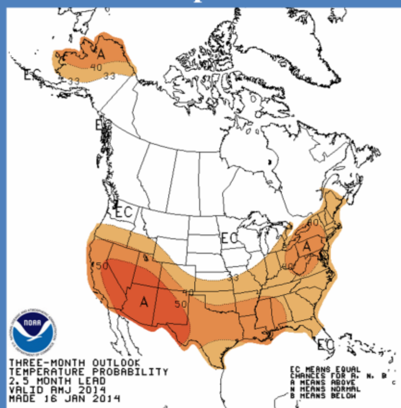
Precipitation



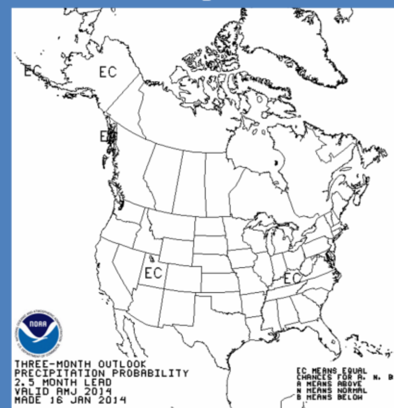
The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.

U. S. Seasonal Outlooks
April – June 2014

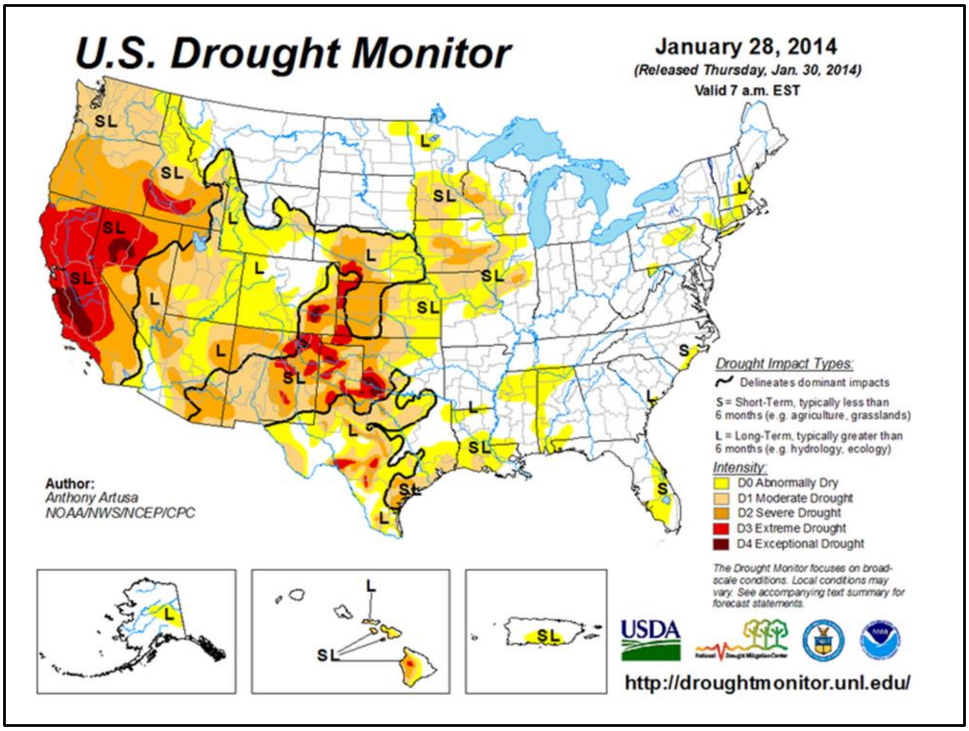
Temperature



Precipitation



The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.


U.S. Drought Monitor
January 28, 2014
(Released Thursday, Jan. 30, 2014)
Valid 7 a.m. EST
Drought Impact Types:
Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)
Intensity:
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.
Author:
Anthony Artusa
NOAA/NWS/NCEP/CPC
USDA
http://droughtmonitor.unl.edu/

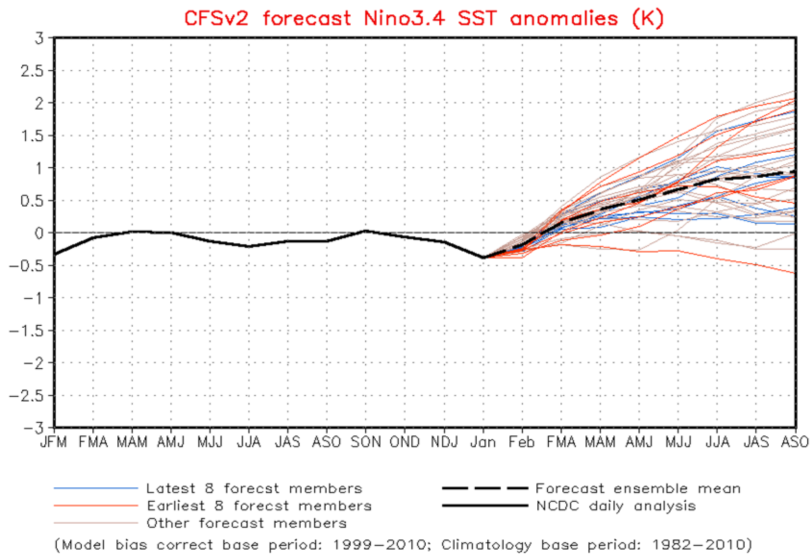
Recent Pacific warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 ºC for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v3b SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)]. For historical purposes El Niño and La Niña episodes are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons. The complete table going back to DJF 1950 can be found by clicking: Historical ONI Values

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2002	-0.2	0.0	0.1	0.3	**0.5**	**0.7**	**0.8**	**0.8**	**0.9**	**1.2**	**1.3**	**1.3**
2003	**1.1**	**0.8**	0.4	0.0	-0.2	-0.1	0.2	0.4	0.4	0.4	0.4	0.3
2004	0.3	0.2	0.1	0.1	0.2	0.3	**0.5**	**0.7**	**0.8**	**0.7**	**0.7**	**0.7**
2005	**0.6**	0.4	0.3	0.3	0.3	0.3	0.2	0.1	0.0	-0.2	**-0.5**	**-0.8**
2006	**-0.9**	**-0.7**	**-0.5**	-0.3	0.0	0.1	0.2	0.3	**0.5**	**0.8**	**1.0**	**1.0**
2007	**0.7**	0.3	-0.1	-0.2	-0.3	-0.3	-0.4	**-0.6**	**-0.8**	**-1.1**	**-1.2**	**-1.4**
2008	**-1.5**	**-1.5**	**-1.2**	**-0.9**	**-0.7**	**-0.5**	-0.3	-0.2	-0.1	-0.2	**-0.5**	**-0.7**
2009	**-0.8**	**-0.7**	**-0.5**	-0.2	0.2	0.4	**0.5**	**0.6**	**0.8**	**1.1**	**1.4**	**1.6**
2010	**1.6**	**1.3**	**1.0**	**0.6**	0.1	-0.4	**-0.9**	**-1.2**	**-1.4**	**-1.5**	**-1.5**	**-1.5**
2011	**-1.4**	**-1.2**	**-0.9**	**-0.6**	-0.3	-0.2	-0.2	-0.4	**-0.6**	**-0.8**	**-1.0**	**-1.0**
2012	**-0.9**	**-0.6**	**-0.5**	-0.3	-0.2	0.0	0.1	0.4	0.5	0.6	0.2	-0.3
2013	-0.6	-0.6	-0.4	-0.2	-0.2	-0.3	-0.3	-0.3	-0.3	-0.2	-0.3	
2014												

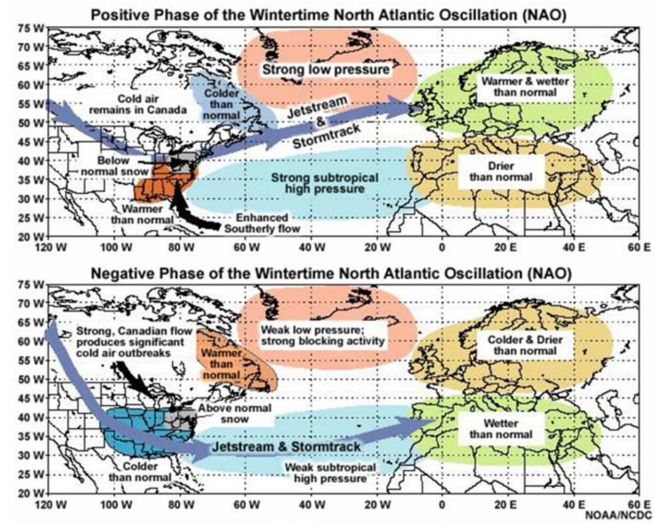
Natural, seasonal variability—
ENSO (El Nino/La Nina)

We have been in ENSO neutral conditions since early 2012.

• Most models predict ENSO-neutral (-0.5ºC to +0.5ºC) to continue through the Northern Hemisphere spring. After that, models predict either ENSO-neutral or El Niño (greater or equal to +0.5ºC) during the Northern Hemisphere summer 2014.



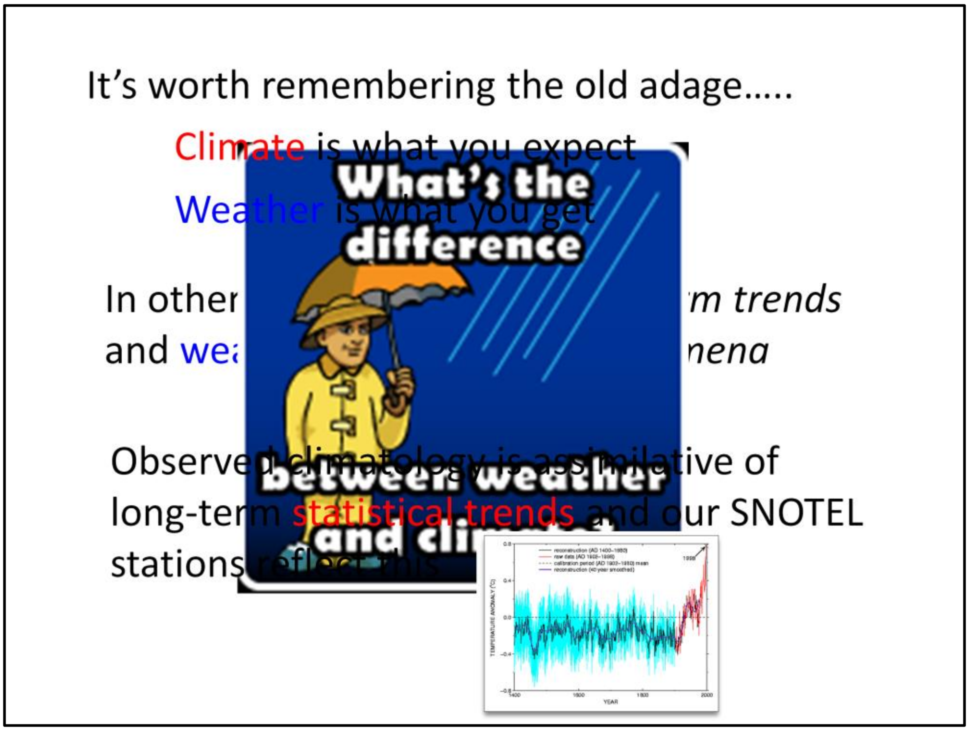
Most models and the ensemble (black dashed line) show an El Nino developing by the April-May-June time period.



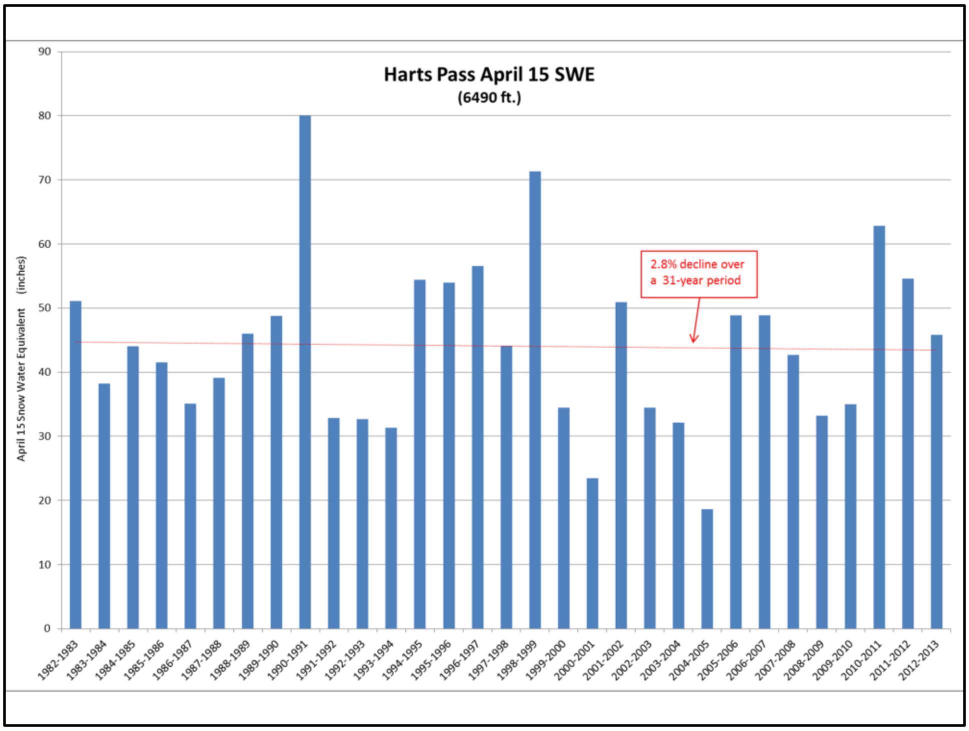
Very important for seasonal weather

Natural, seasonal variability—North Atlantic Oscillation

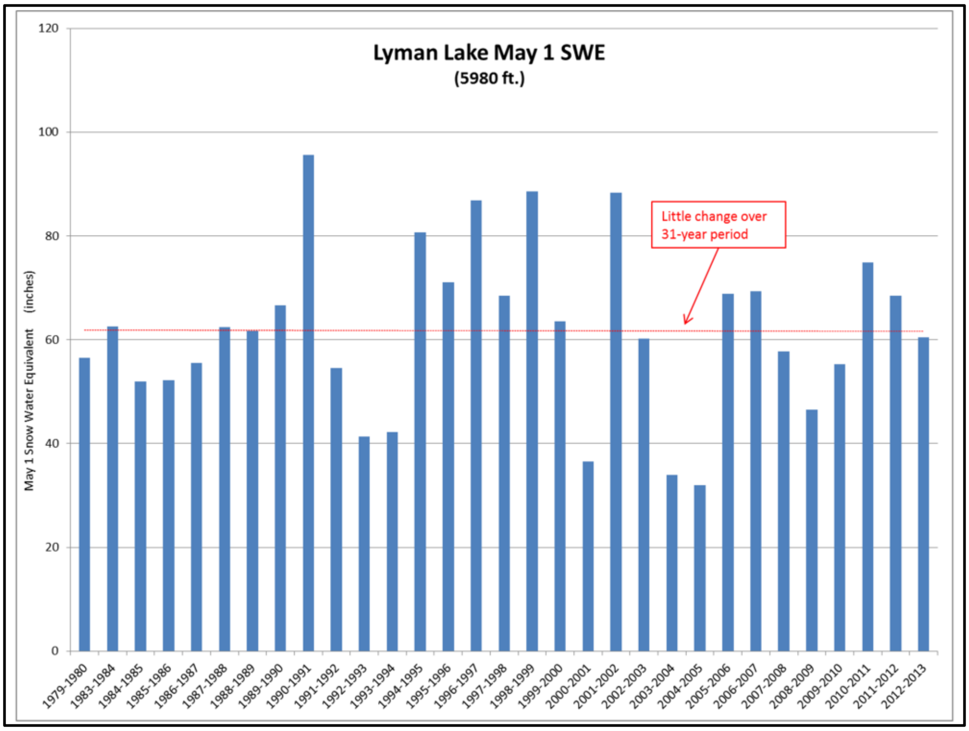
The North Atlantic Oscillation is another well-known natural, shorter duration phenomena that can affect seasonal weather patterns.



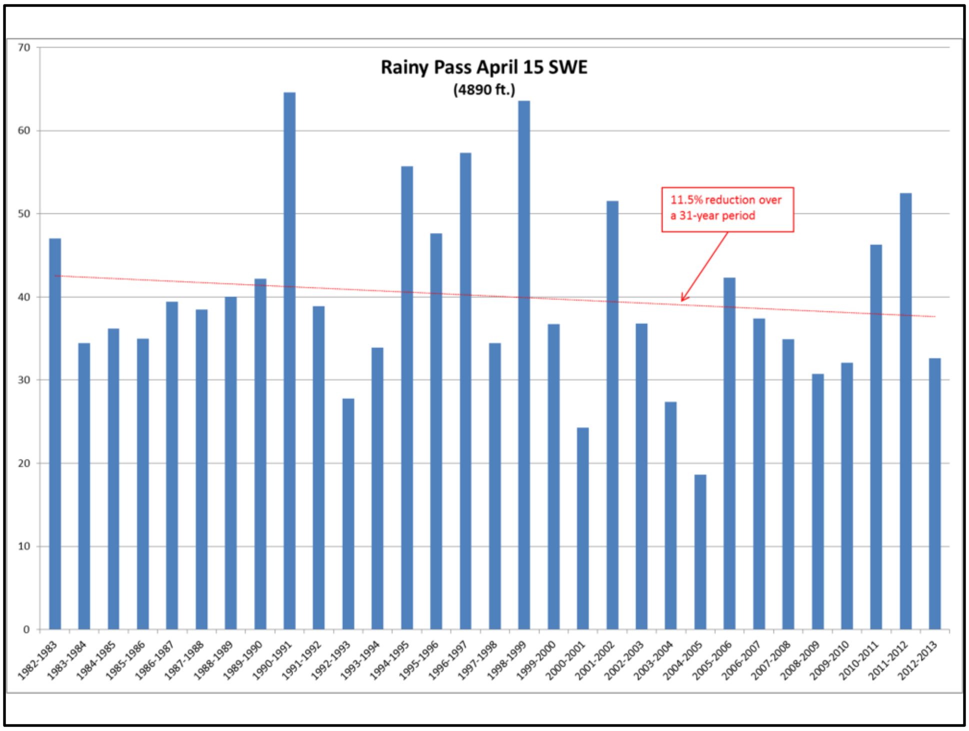
Folks need to understand the difference between weather and climate—they are different but commonly misunderstood.



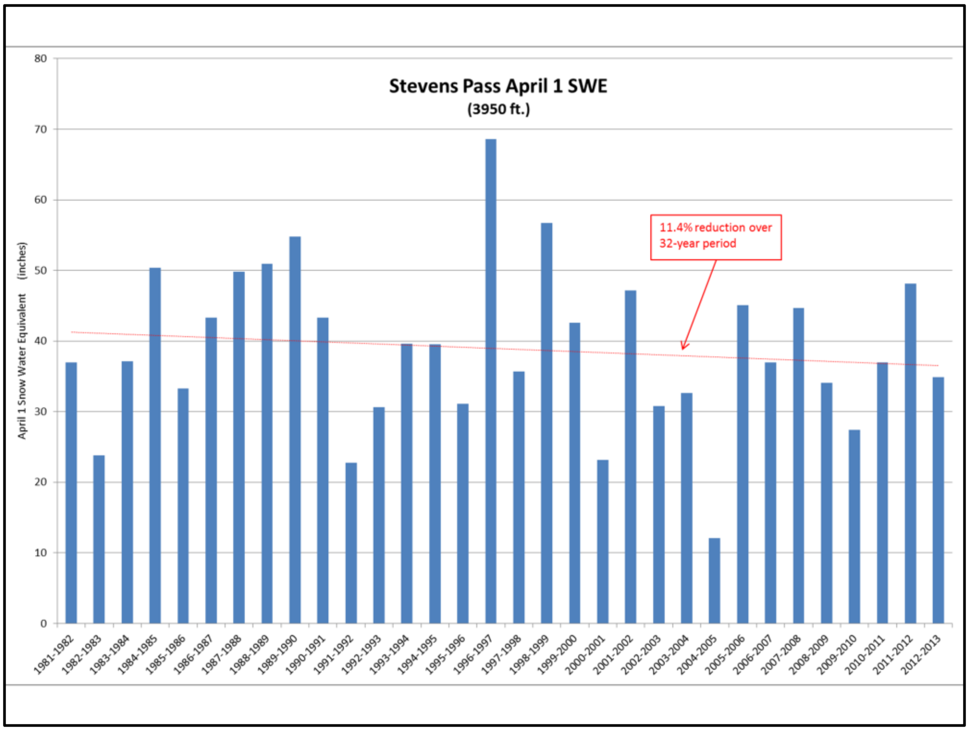
One of our high-elevation sites that shows little decline in April 15 Snow Water Equivalent over the 30-year timeframe.



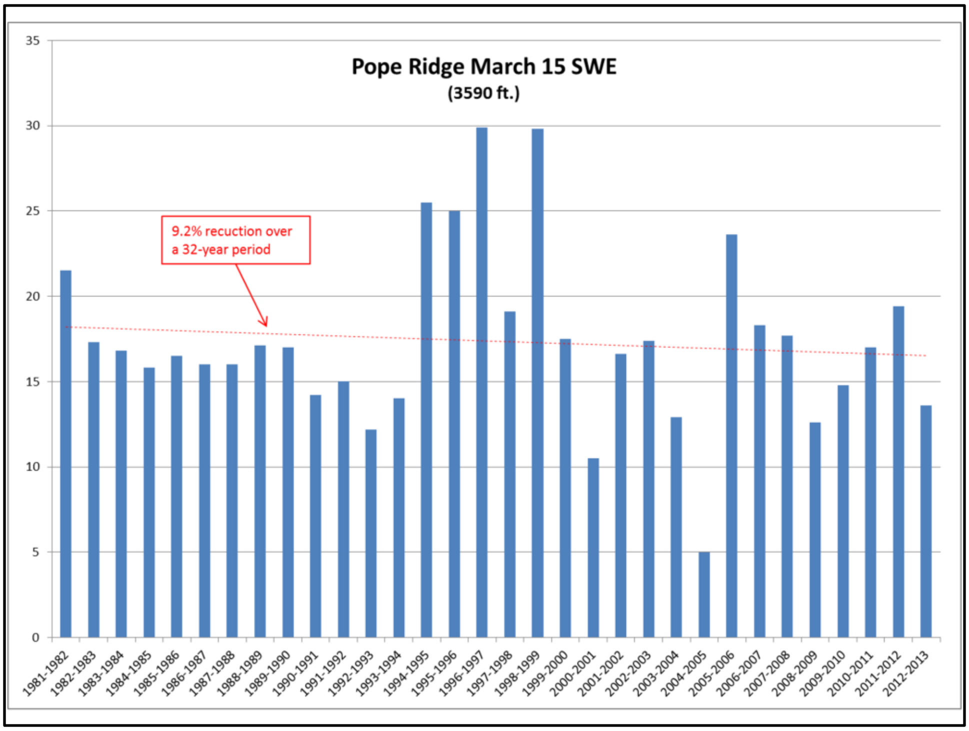
Another high-elevation site showing little change in May 1 SWE. The dates for each of these graphs are chosen by the mean peak accumulation date.



Below 1800m (5900 ft) we begin to see a stronger decline in peak date SWE. This seems to indicate earlier melting at lower elevation sites, as others in the literature have shown.



Another site below 1800m (5900 ft) showing a stronger decline in peak date SWE. This would indicate earlier melting at lower elevation sites, as others in the literature have shown.



Another site below 1800m (5900 ft) showing a stronger decline in peak date SWE. This would indicate earlier melting at lower elevation sites, as others in the literature have shown.

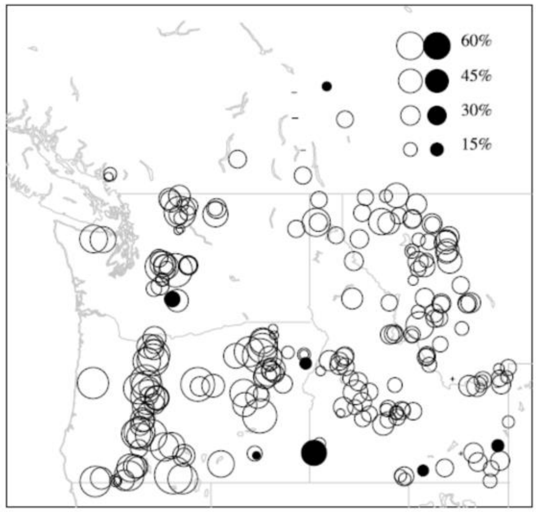


Figure 1. Linear trends, relative to starting value, in snow water equivalent (SWE) on April 1 over the period of record 1950–2000. Negative trends are shown as open circles, positive trends as solid circles; the magnitude of the trend is indicated by the area of the circle according to the legend. Trends less than 5% in absolute value are indicated by a + or − symbol.

Source: Mote, 2003

Mote (2003) evidence of largely negative trends in SWE decline on April 1st going back to 1950. Trends would likely be even stronger if data for 2001-2013 were included as these were generally earlier melting years in the PNW.

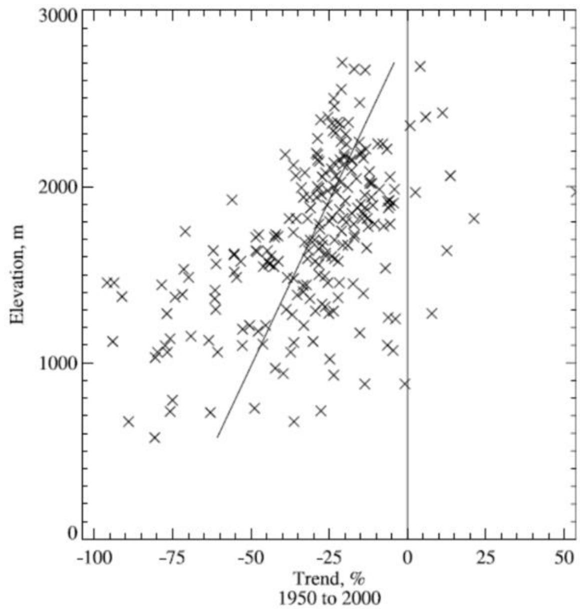
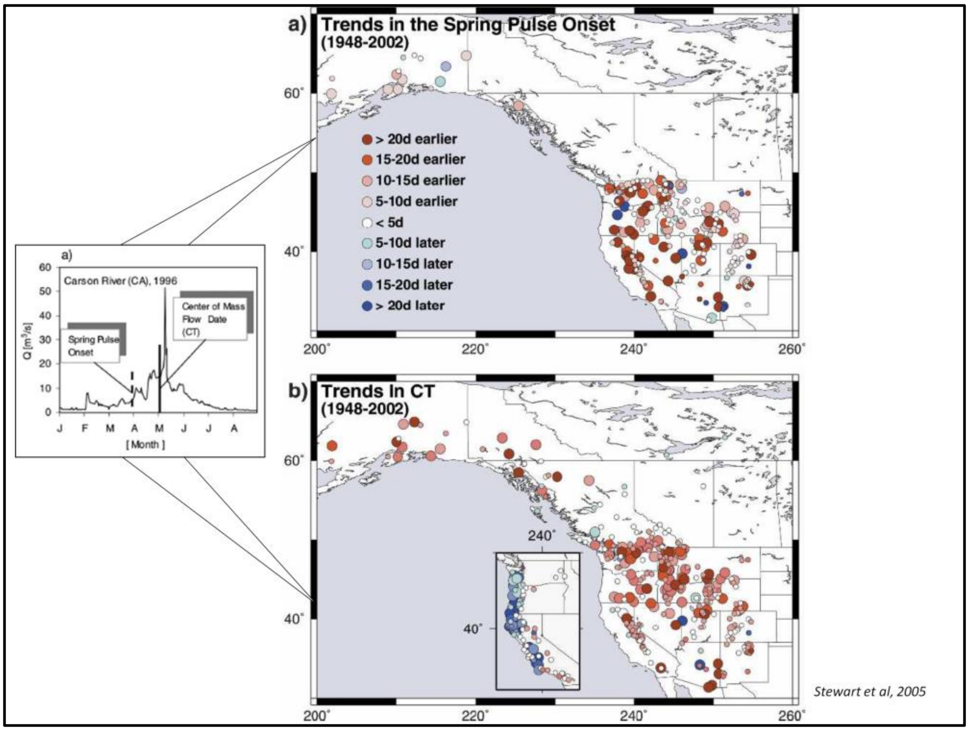


Figure 4. Relative trend in April 1 SWE plotted against snow course elevation (crosses) along with a linear fit.

Source: Mote, 2003

Mote (2003) evidence showing strongly negative trends, particularly below 1800m (5900 ft).



Westwide trends showing earlier onset of spring pulse (i.e., when hydrograph begins to spike upward) and center of mass (i.e., middle of hydrograph). Note that coastal rain-dominated basins are showing later trends in CT.

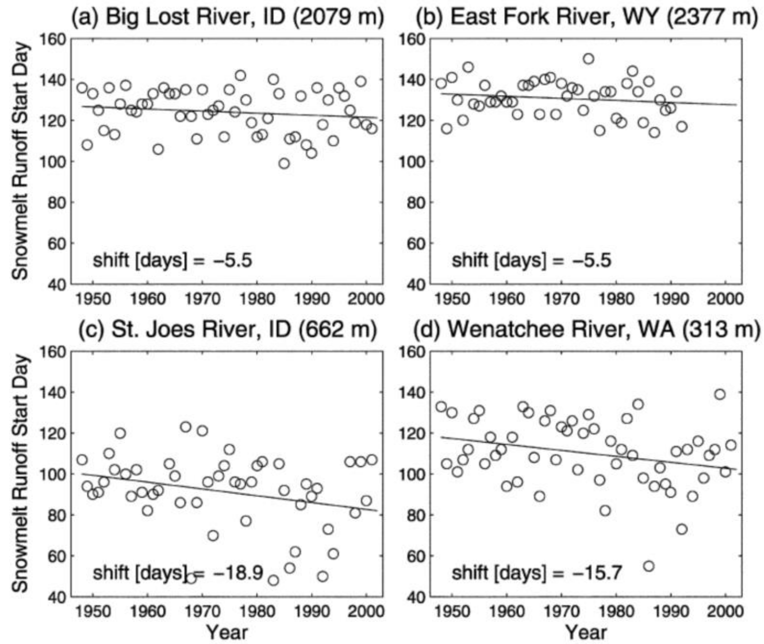
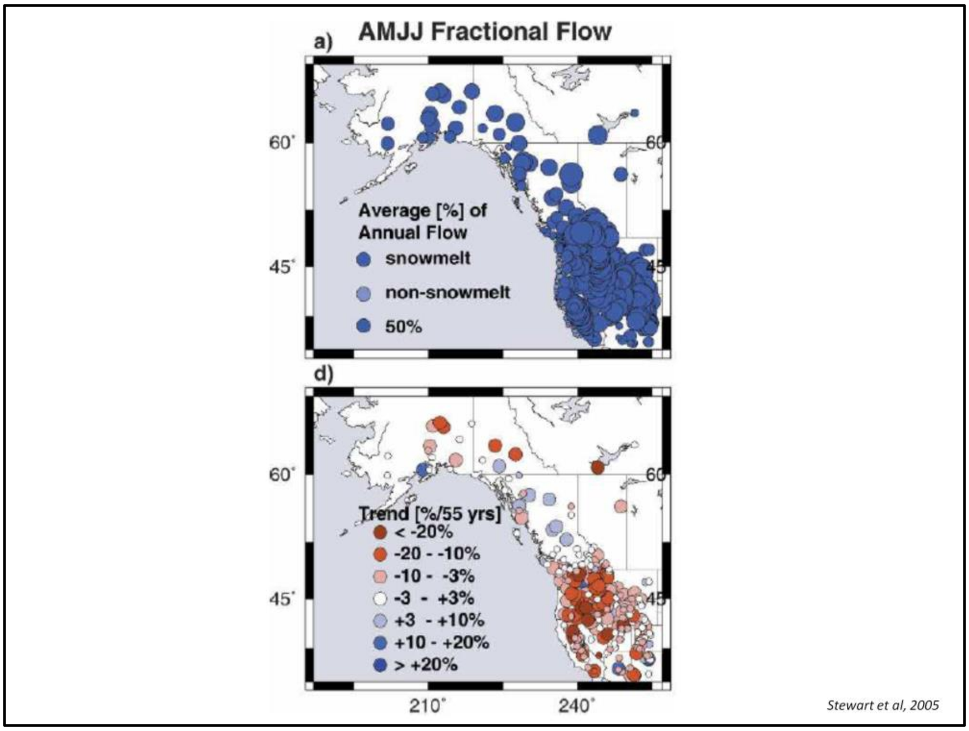


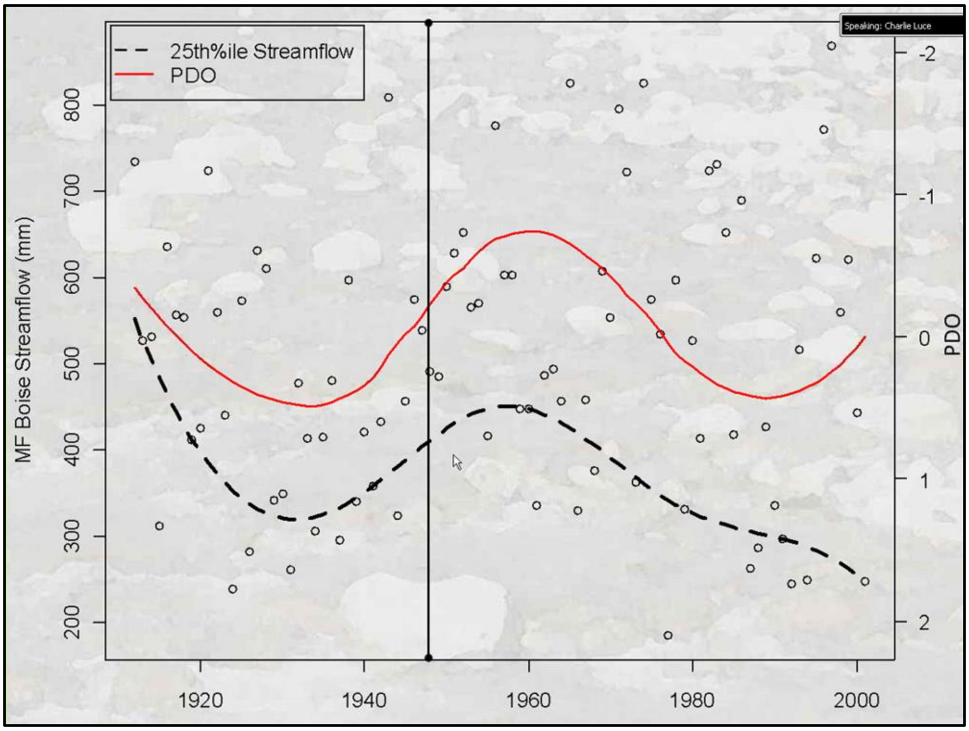
FIG. 3. Observed spring pulse onset dates for (a), (b) two high- and (c), (d) two midaltitude stream gauges, illustrating differences in magnitude of the observed time shift.

Stewart et al, 2005

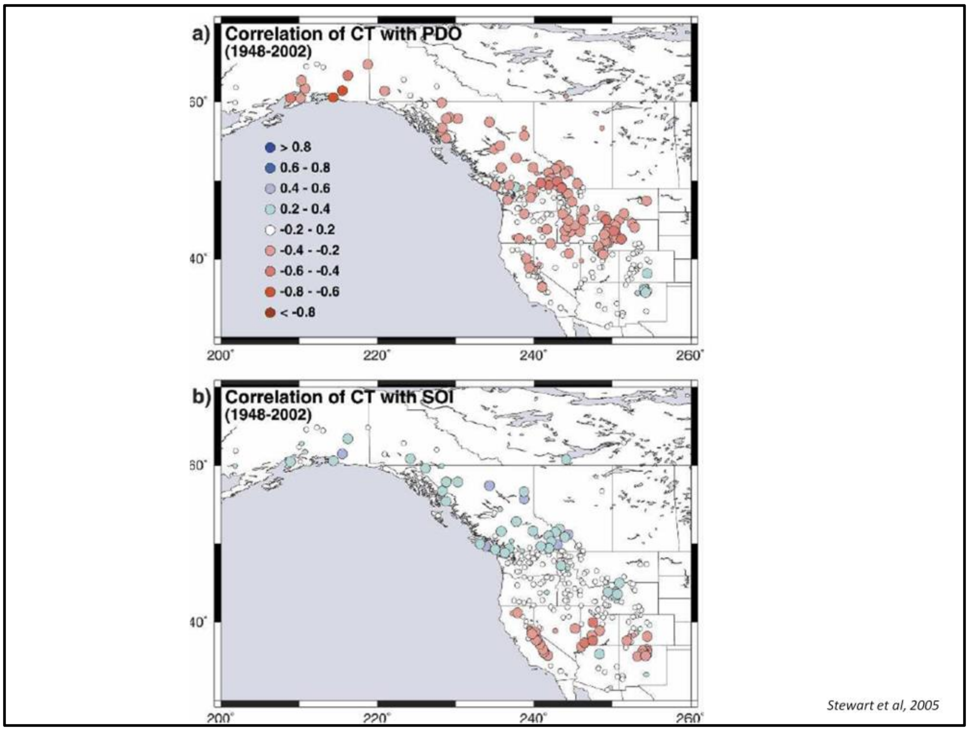
Shift toward earlier onset spring pulse dates (i.e., onset of runoff) is more pronounced for lower elevation sites than higher.



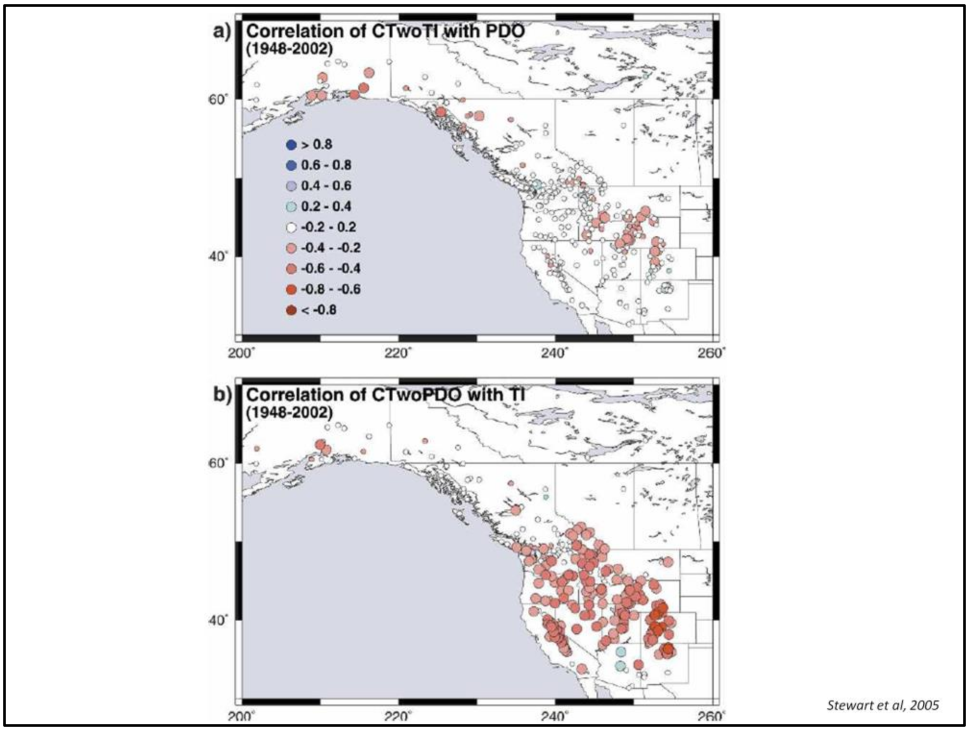
This shift to earlier runoff timing is very, very important in snowmelt driven watersheds across Western Nam because April-May-June-July flows comprise 50% - 80% of total annual streamflow. Earlier runoff has consequences for species and water users who rely on adequate water and habitat conditions during the low-flow periods. For both people and aquatic organisms, surviving summer low flows is a challenge.



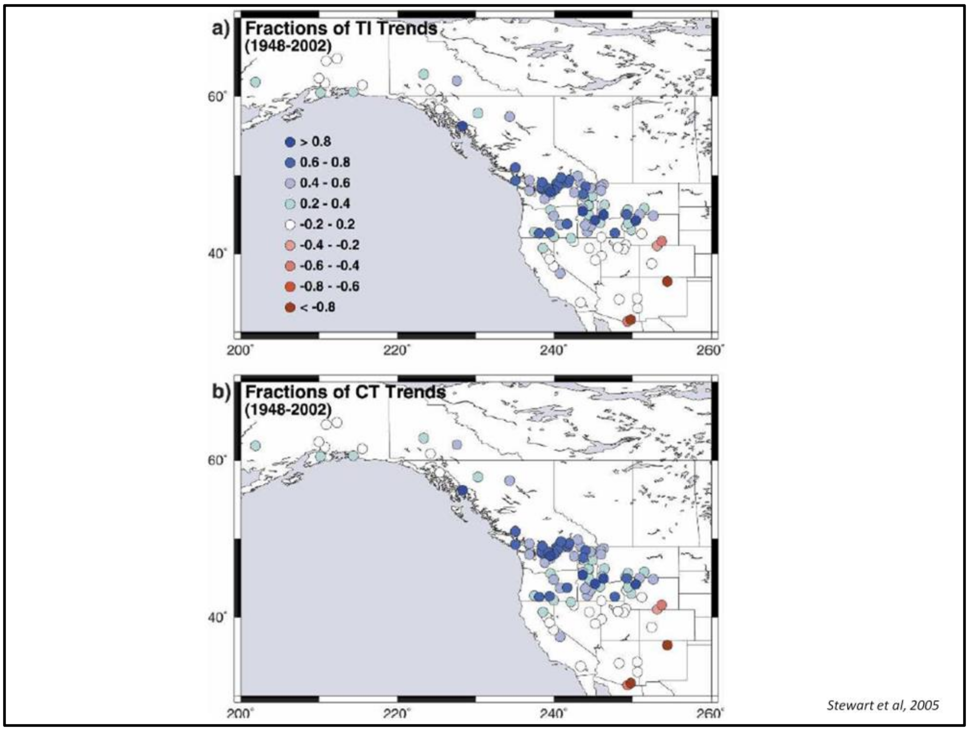
Relationship between PDO phase and (for example) the driest 25% of years.
The **Pacific Decadal Oscillation** (PDO) is the leading EOF of monthly sea surface temperature anomalies (SSTA) over the North Pacific (poleward of 20° N) after the global mean SSTA has been removed, the PDO index is the standardizedprincipal component time series.[1]
The PDO is detected as warm or cool surface waters in the Pacific Ocean, north of 20° N. During a "warm", or "positive", phase, the west Pacific becomes cool and part of the eastern ocean warms; during a "cool" or "negative" phase, the opposite pattern occurs. It shifts phases on at least inter-decadal time scale, usually about 20 to 30 years.
The Pacific (inter-)decadal oscillation was named by Steven R. Hare, who noticed it while studying salmon production pattern results in 1997. The prevailing hypothesis is that the PDO is caused by a "reddening" of the El Niño–Southern Oscillation (ENSO) combined with stochastic atmospheric forcing.



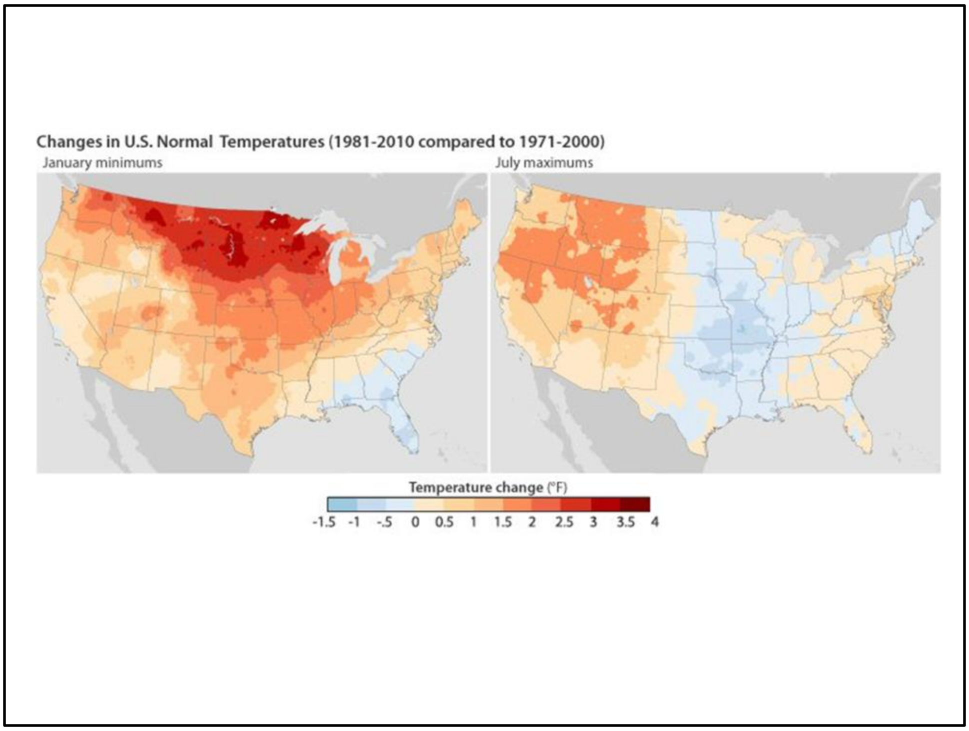
Some changes in Center Timing (CT) of runoff can be explained by PDO, particularly in the PNW where it's effect is known to be greatest (Mantua et. al. 1997) but little correlation with ENSO (Southern Oscillation Index; SOI). However, strong west-wide decreases in CT (earlier runoff) are seen irrespective of PDO phase (warm or cool).



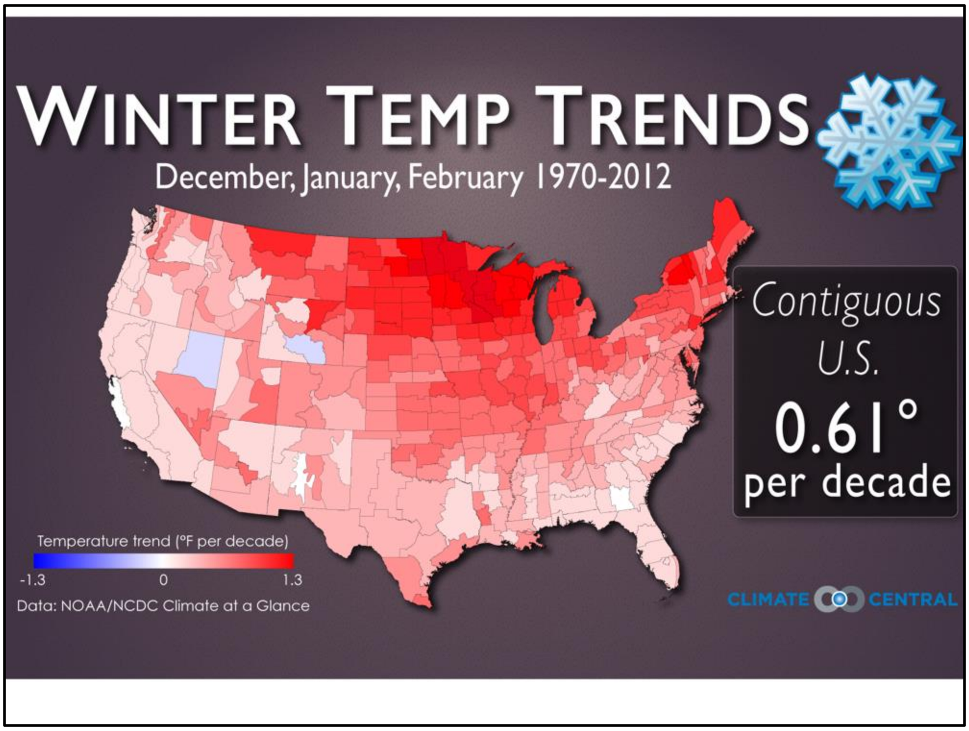
Statistical correlations of the influence of temperature (TI) and the PDO on earlier observed runoff timing. a) shows that removing the effects of warmer winter/spring temperatures but keeping PDO influences results in little correlation. b) however, when the PDO is removed, temperature alone exerts a strong control on runoff timing (CT). In other words, temperature-dependent streamflow timing variations remain when PDO influences are removed, but not vice versa.



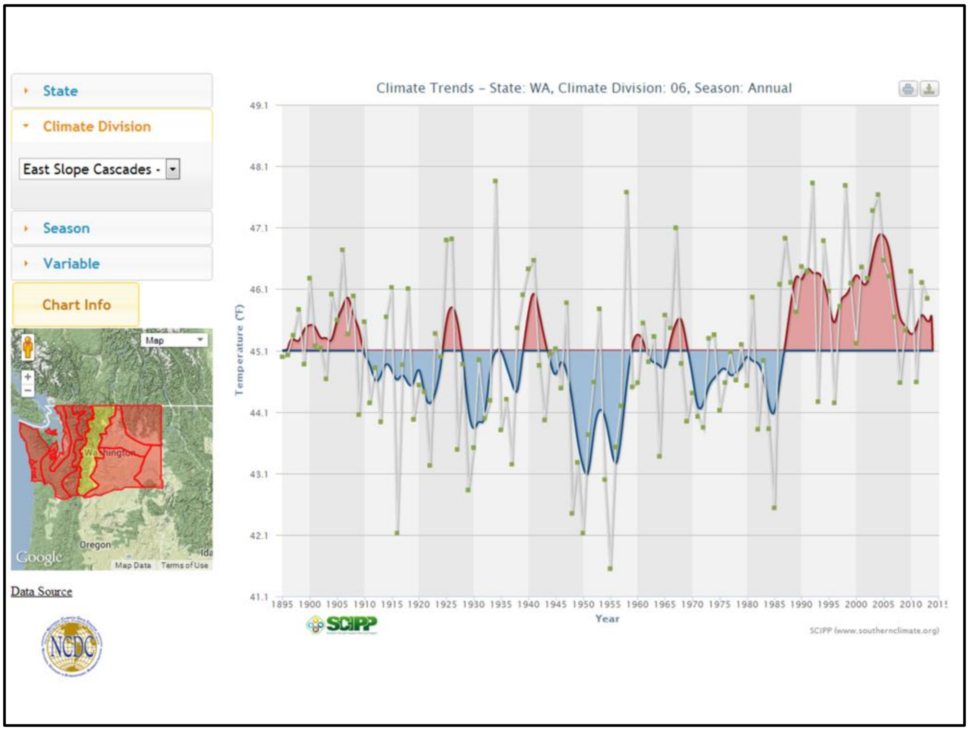
When taken together, the remainder (percentage of CT still explained by PDO) of runoff that can be explained by PDO across opposite phases (both warm and cool). In other words, PDO accounts for considerable amount of variance in runoff timing over a range of interannual to decadal, but not as much as local spring temperature (TI) variations do. The 1976-77 PDO shift accounts for less than half of the observed streamflow timing trend in most western rivers, except the PNW. Since this study, the PDO has shifted back to a cool phase and yet the streamflow timing trends are continuing unabated (evidence for broader climatological forcing).



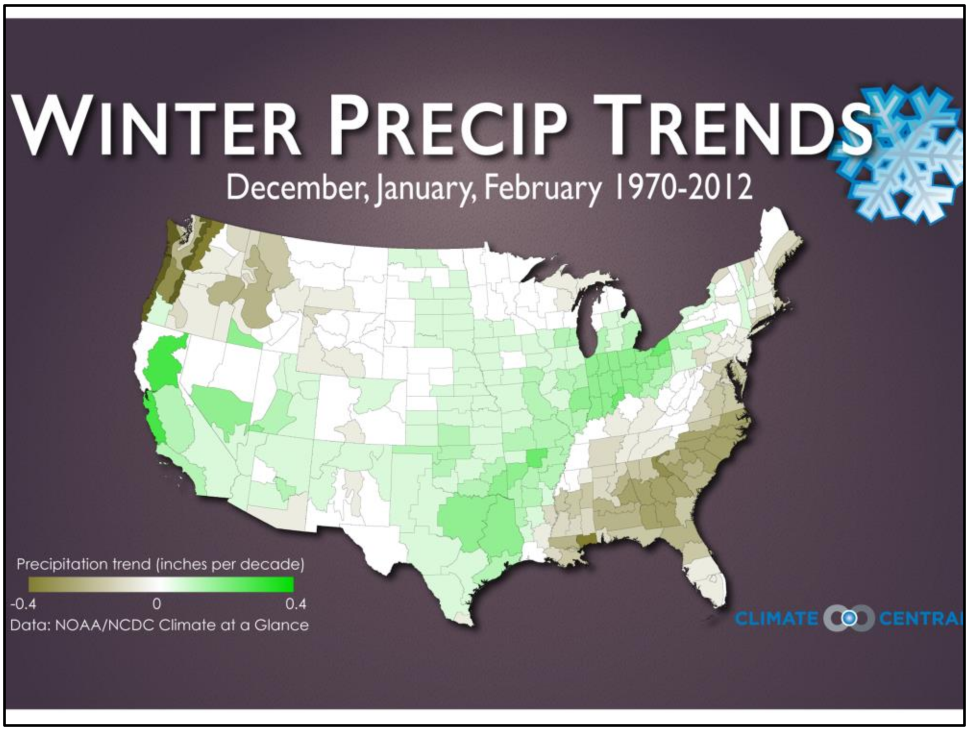
Changes in the 30-year period represent a decadally shifted baseline. A 30-year period is the standard meteorological practice employed by the World Meteorological Organization (WMO) to calculate "normals" or "averages". It is important to note that what we consider "average" may be relative to a 30-year baseline which is numerically different from the previous. For example, in our area the 2000's were very warm, thus shifting the new normal period to include a warmer decade than the 1970 – 2000 period. Thus, warm temperatures experienced now are closer to "average" than they would've been under the cooler 1970-2000 baseline. Beware the word "average" because it includes a shifting—not continuous—baseline.



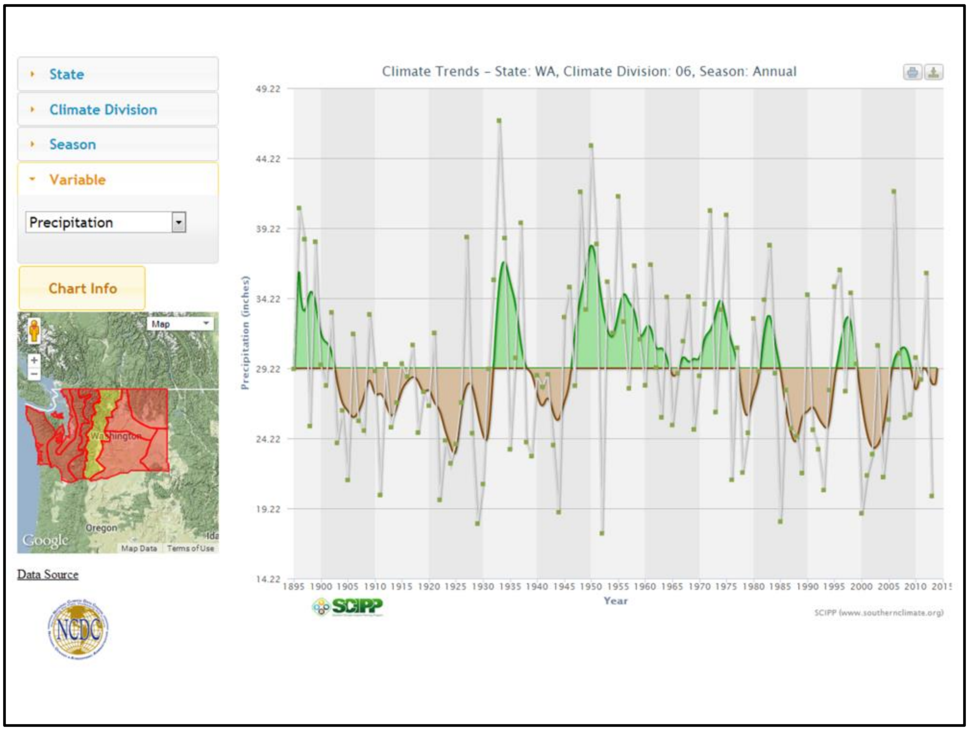
Winter temperature trends over the most recent 40-year period. Note stronger warming in the northern US and in the WA Cascades.



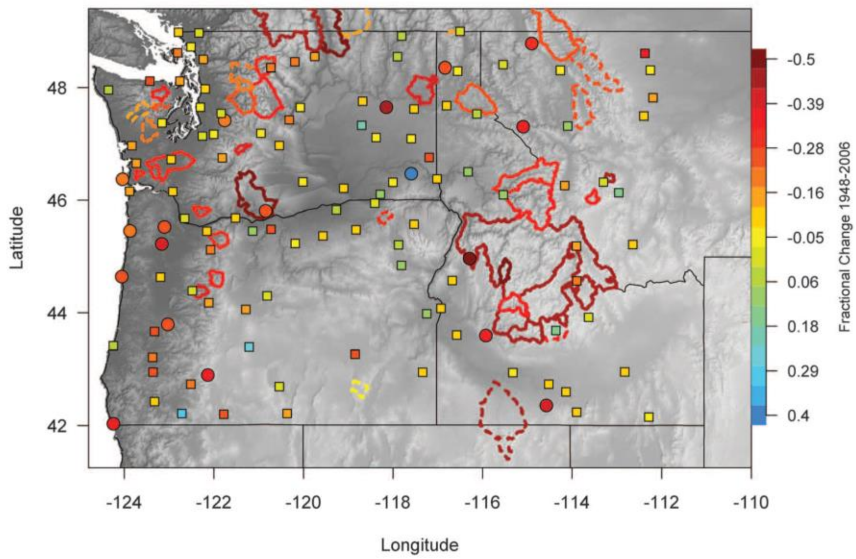
Annual changes in temperature over a longer time scale (120 years) for the eastern Cascades region. Note that considerable warming has been seen since the mid-1980s. Tree ring temperature reconstructions show that spring temperatures over the last 50 years are higher now than they've been at any time in the last 900 years. (Jones et al 2001).



Winter precipitation trends over the most recent 40-year period. Note the sharply drier conditions in the Pacific Northwest.



Annual changes in precipitation over a longer time scale (120 years). Generally no clear pattern emerges for the eastern Cascades region.



Luce et al, 2013

Location and trends of lower-quartile annual (water-year) precipitation and streamflow at HCN precipitation stations (points) and Hydro-Climatic Data Network streamflow gauges (watershed outlines) from 1948 to 2006. Statistically significant trends are denoted with circles for precipitation and with solid boundaries for streamflow. Squares and dashed boundaries denote nonsignificant trends.

Previous studies have generally shown nonsignificant trends in precipitation over the past 50 years, despite an significant decrease in annual streamflow. This paradox has been hypothesized to be caused by increased evapotranspiration (ET) but since the precip stations do not fall within the watersheds where streamflow is measured, this makes quantitative comparison impossible. Physical calculations of energy balance (i.e., increases in ET cannot exceed incoming solar energy) have been computed and show that while there has been a small increase in ET, the observed reductions in streamflow cannot be explained by this factor alone.

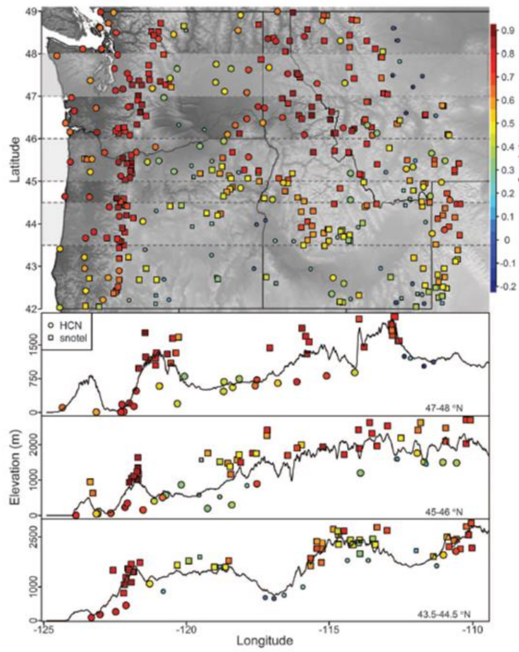
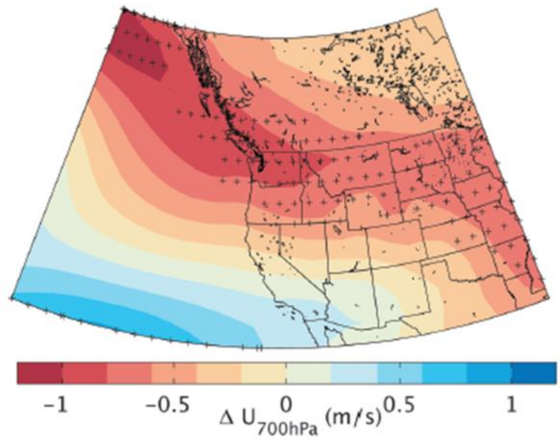


Fig. 2. Correlation of 1982–2012 November to March HCN (circles) and SNOTEL (squares) precipitation with November to March u700 zonal winds over 42.5° to 47.5°N and 115° to 130°W. Three longitudinal transects (lower panels) show examples of the pattern of correlations with elevation. The larger symbols indicate statistical significance ($P < 10\%$).

Luce et al, 2013

Plots showing significant correlations with precipitation and 700mb (~10,000 ft) winds over the recent 30-year period on the windward side of the Cascades. Note the much lower correlations on the leeward side of mountain ranges where measured precipitation is not driven by orographic forcing. Strong evidence that orographic forcing has been reduced on the windward side of the Cascades and Rockies which better explains the reduction in annual streamflow over this timeframe (previous slide).

Fig. 4. Projected changes in November to March u700 zonal wind averaged across 24 CMIP5 models, 2071–2100 versus 1971–2000 RCP8.5. Plus signs denote areas where >80% of the models agree on the sign of the change. 20 of the 24 models predict a decrease in the PNW.



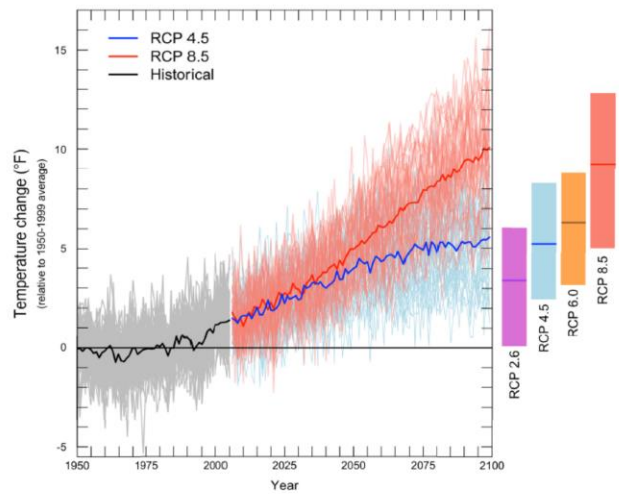
Luce et al, 2013

Late 21st century projections for 700mb (~10,000 ft) winds during the winter snow accumulation season. Strong reductions in wind speeds would have dramatic repercussions for mountain watersheds that rely on snowmelt. These physical relationships are likely not well-captured in most current climate models.

Box ES-1. Projected changes in key Pacific Northwest climate variables.

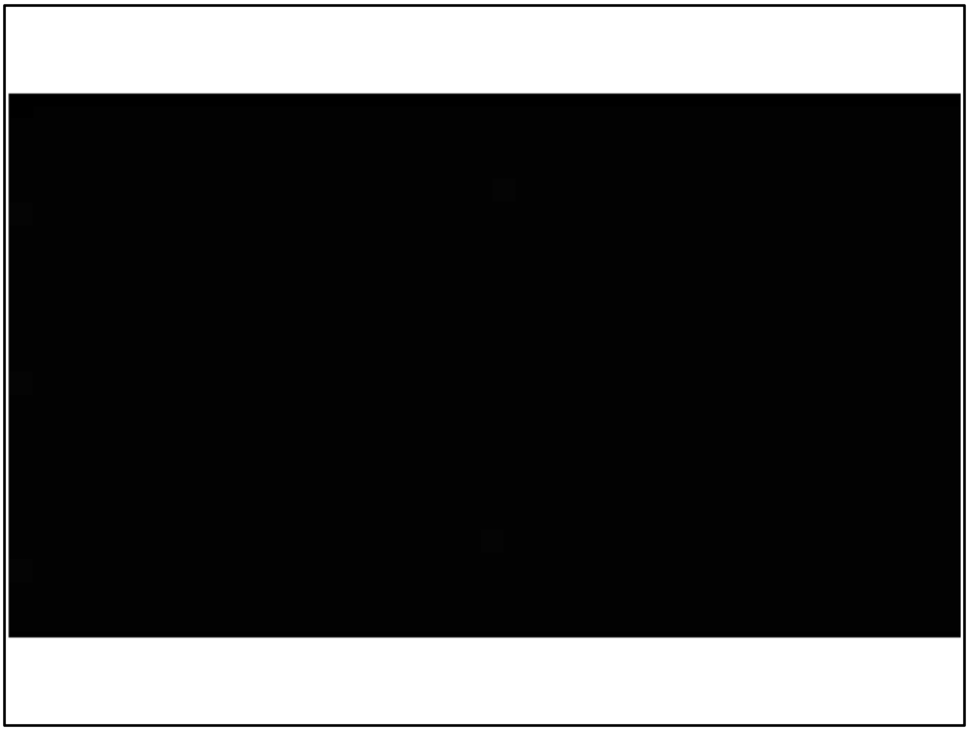
- *Average annual temperature, for 2050s*: +4.3°F (range: +2.0 to +6.7°F) for a low greenhouse gas scenario or +5.8°F (range: +3.1 to +8.5°F) for a high greenhouse gas scenario (both relative to 1950-1999).
- *Extreme precipitation, for 2050s:* number of days with more than one inch of rain increases +13% (±7%) for a high greenhouse gas scenario (relative to 1971-2000).
- *Average April 1 snowpack in Washington State, for 2040s:* -38 to -46% for a low and a medium greenhouse gas scenario (relative to 1916-2006).
- *Sea level in Washington State, for 2100:* +4 to +56 inches for low to high greenhouse gas scenarios (relative to 2000). Local amounts of sea level rise will vary.
- *Ocean acidity, for 2100:* +38 to +41% for a low greenhouse gas scenario and +100 to +109% for a high greenhouse gas scenario (relative to 1986-2005).

See Sections 3 and 6 for more detailed projections and additional time periods.



Univ of WA Climate Impacts Group, 2013

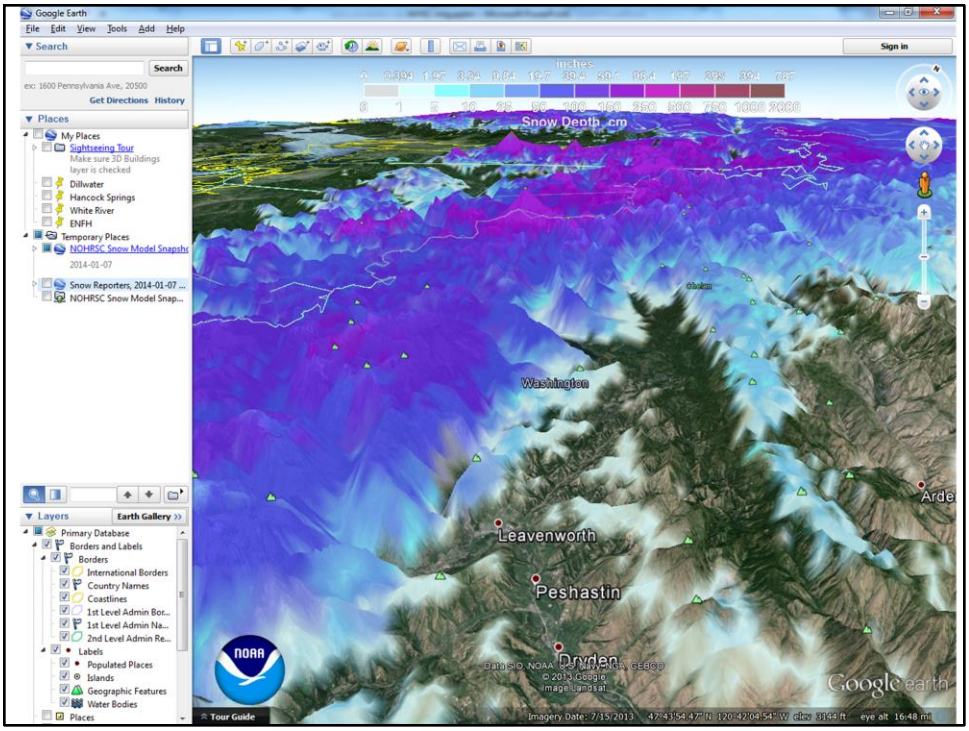
Summary of most recent predicted changes to the Pacific Northwest.



http://www.youtube.com/watch?v=_nzwJg4Ebzo
Video describing possible relationships between Arctic Amplification (warmer arctic largely due to a loss of sea ice and reduced albedo) and reduced jet stream velocities. Also results in increased jet meandering and patterns getting “stuck” longer. There is still considerable disagreement about this hypothesis in the published meteorological literature.

Conclusions

- Current drought unprecedented at lower elevations, among the worst on record at higher elevations
- Significant and ongoing reductions in SWE across all time scales—but beware the baseline for consideration of “normal”
- Continued decline in SWE on typical peak accumulation date, particularly <1800m
- Earlier runoff producing reduced predictability for humans and ecosystems
- What we’re observing can be partially explained by PDO variability but some cannot
- No significant relationship to other intra/interannual processes like ENSO
- Reasons for earlier runoff appears to be warmer spring temperatures
- Reasons for SWE decline:
    - Reductions in mountain precip (driven by reductions in orographic forcing)
    - Increases in temperatures, particularly at low and mid-elevations (<1800m)
- Potential for wide-reaching effects to hemispheric circulation due to changes in equatorial-polar temperature gradient



The National Operational Hydrologic Remote Sensing Center (NOHRSC) produces many great products now available on the web that are derived from remotely sensed (i.e., satellites) sources that cover an entire area (as opposed to SNOTEL sites which are only single points).

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Useful Links

Univ. of Washington Climate Impacts Group:
http://cses.washington.edu/cig/

UW Hydrologic Climate Change Scenarios for Columbia R Basin:
http://warm.atmos.washington.edu/2860/

USGS County-Level Climate Change Projections:
http://www.usgs.gov/climate_landuse/clu_rd/nex-dcp30.asp

Daily NRCS SNOTEL % of Average SWE and Precipitation Tables (updated daily):
http://www.wcc.nrcs.usda.gov/ftpref/data/snow/update/wa.txt

NRCS WA SNOTEL Statewide Map and Data:
http://www.wcc.nrcs.usda.gov/snotel/Washington/washington.html

Monthly WA State Climatology Newsletters:
http://www.climate.washington.edu/newsletter/

WA State Climatology Trends (Temp, Precip, SWE for 1895 – 2010 by region):
http://www.climate.washington.edu/trendanalysis/

NOAA Remotely Sensed Snow Data:
http://www.nohrsc.noaa.gov/